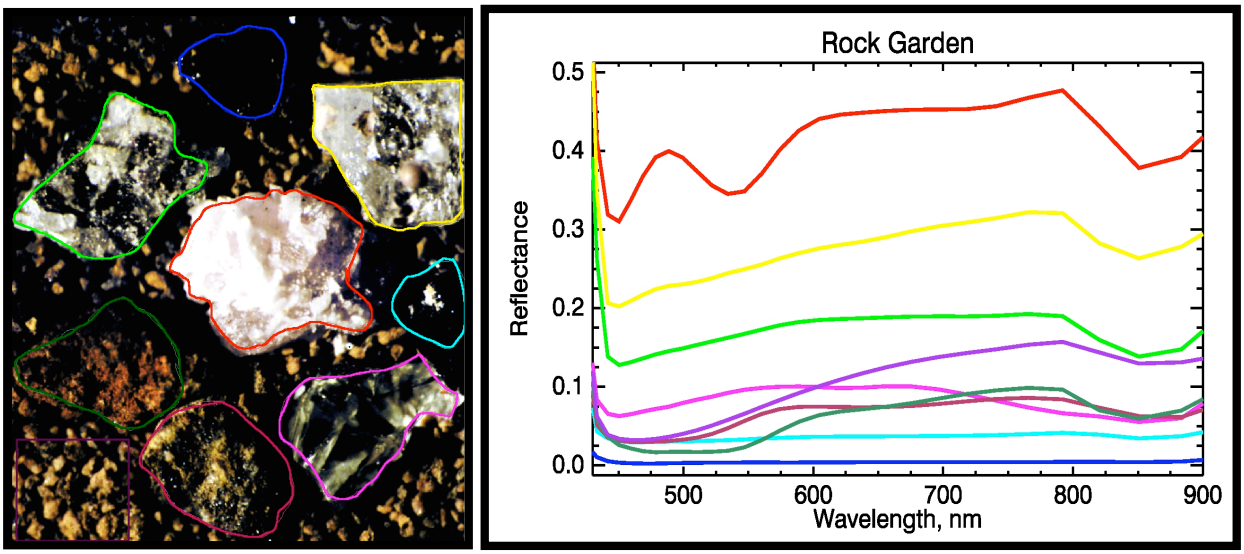
THE COMPACT MICRO-IMAGING SPECTROMETER: A NEW TOOL FOR ASTROBIOLOGY. R. G. Sellar[1] and J. C. Armstrong[2], [1]Jet Propulsion Laboratory, California Institute of Technology (Pasadena, CA 91109, glenn.sellar@jpl.nasa.gov), [2]Weber State University (2508 University Circle, Ogden, UT, 84408-2508, jcarmstrong@weber.edu).

In-situ identification of trace minerals, ices, or organics in planetary samples may be difficult with panchromatic microscopic imagery and 'spot' spectroscopy. The panchromatic imagery acquired by a microscopic imager provides morphological information and albedo, but these are generally insufficient for unambiguous identification. The spatially-averaged spectra acquired by a non-imaging ('point-' or 'spot-') spectrometer may enable identification of the major components but identification of unknown trace components is difficult at best. With our Compact Micro-Imaging Spectrometer (CMIS), however, we acquire spectroscopic data in an imaging format at microscopic scales. The distinct spectra of individual grains should make detection, discrimination, and identification possible even for trace components in regolith or heterogeneous samples.

CMIS is an imaging spectrometer of the interferometric windowing class , based on a Sagnac interferometer. For a cost-effective proof-of-concept we initially constructed a breadboard instrument operating in the visible/near-infrared (VNIR) spectral range from 0.4 - 1.0 _m,. This VNIR breadboard has demonstrated discrimination of components at microscopic scales. A version operating in the 0.9 - 1.7 _m range is near completion, and a 1.2 - 4.0 _m version is also being constructed, with the objective of providing identification capability as well.



Left figure shows an approximately-true-color image of a microscale 'rock garden' derived from a 27-band hyperspectral data cube by integrating to three bands with gaussian response functions for 'red' (604 to 820 nm), 'green' (499 to 588 nm), and 'blue' (441 - 488 nm); the field of view in this image is 3.3 × 4.0 mm (494 × 600 pixels); grain samples (from upper left, clockwise) are: andesite, magnetite, halite, grey hematite, olivine, geothite, red hematite, and rhodochrosite (center) on a background comprised of palagonite grains sieved to 75 - 150 _m. Right figure shows sample spectra extracted from the datacube for the regions outlined in the image.